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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,573	03/11/2004	Charles E. Taylor	SHPR-01360USP	6486

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EXAMINER	
OLSEN, LIN B	

ART UNIT	PAPER NUMBER
3661	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/799,573	TAYLOR ET AL.	
	Examiner	Art Unit	
	LIN B. OLSEN	3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 June 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21,24,26-31 and 34-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21,24,26-31 and 34-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to the filing on June 11, 2009 of response to the Office Action of December 11, 2008. The application current contains 33 claims with claims 1, 8, 15 and 24 being independent.

Response to Amendment and Argument

Applicant's arguments see page 10 filed June 11, 2009, with respect to the rejections under 35 USC 112 have been fully considered and are persuasive. The rejections of claims 1, 8, 15, and 24 under 35 USC 112 have been withdrawn.

Applicant's arguments with respect to claims 1-21 and 24-31 have been considered but are moot in view of the new ground(s) of rejection.

Specification

The disclosure is objected to because of the following informalities: In paragraph 17 of the printed publication of the application, the patent number of the Bamji patent should be 6,323,942.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim **36** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim states "**The robot of claim 1, wherein one or more detectors are positioned around the perimeter of the robot.**" However, the specification does not support this. In discussing Fig. 1, paragraphs 14 – 19 discuss the infrared sensor system and supporting circuitry claimed in claim 1. This is specifically described as a 2D array. In paragraph 20, "other sensors" are described as positioned around the perimeter of the robot. Since these are distinguished from the sensors of claim 1, the Examiner does not believe description supports the sensors of claim 1. Further, detectors positioned around the perimeter of the robot would form a three dimensional arrangement of detectors, which is contrary to claim 1.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims **1-3, 5-10, 12-17,19-21, 24, 26-31 and 35** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,323,942 to Bamji (Bamji) in view of U.S. Patent No. 5,995,883 to Nishikado (Nishikado). Bamji is concerned with an imaging system including a two-dimensional array of pixel light sensing detectors and

dedicated electronics to support the array. Nishikado is concerned with an autonomous vehicle that incorporates a distance measuring sensor that measures a distance to an object.

Claims 8 and 24 are the method versions of claims 1 and 15 respectively and are rejectable for the same reasons as the system claims.

Regarding independent **claims 1, 8, 15, and 24, A robot comprising:**

a motion unit;

a two-dimensional (2D) array of detectors supported by the motion unit, each detector having a counter associated therewith, the 2D array operable to generate a frame of distance indications to one or more features in an environment in which the robot operates; - Bamji describes a 2D array of detectors, each detector having an associated high speed counter (Abstract and Figs. 2 and 3). The 2D array generates a frame of distance indications (TOF) that permits reconstruction of a light-reflecting surface of an image within range of the sensors (Abstract, Fig. 2). Bamji's sensor is not mounted an a unit, but in col. 2, lines 41-42 it is suggested that a robot could use it to measure distances. Nishikado describes an autonomous vehicle (robot) that uses a sensor to measure distance to a possible contacting device (Abstract and Fig. 3). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Bamji's sensor in Nishikado's robot to allow it to avoid objects in the environment.

an infrared sensor including:

(a) an infrared light source configured to produce a plurality of pulses of infrared light directed toward the environment of the robot; and - Bamji, Col. 5, lines 15-17 infrared light preferred in the implementation. Col. 5, line 38 – processor causes light source 220 to emit a pulse of light toward object external to sensor, while in col. 10 it is suggested that multiple pulse can be used.

(b) at least one optic element configured to focus a plurality of reflections of the infrared light pulses from the environment of the robot to the 2D array of detectors, causing the detection of the 2D array of detectors; and – See Bamji Fig. 2, element 290 described at col. 5, lines 55-64.

at least one processor operatively coupled to the 2D array of detectors, the processor operable: - See Bamji Fig. 2 element 260.

(a) to determine one or more features of the environment based at least in part on one or more frames of distance indications; and - See Bamji – col. 7, lines - See Bamji – col. 7, lines 1-5.

(b) to control the motion unit of the robot to avoid the one or more detected features. – The Bamji/Nishikado would use the microprocessor in the Nishikado system to receive the information from the sensor array and control the motion unit. It is well established that it is a matter of design choice whether to perform functions all in one unit or to parse them between equally capable entities, both having a reasonable expectation of success.

Regarding **claims 2, 9, 16 and 26,** which are dependent in claims 1, 8, 15 and 24 respectively, **The robot of claim 1, wherein the distance indication is produced by the counter measuring a period of time to receive a reflected pulse.** – Bamji describes two ways to measure distance, the first embodiment, extending across columns 4 – 12, especially col. 5 lines 18-21 utilizes a detector, counter and clock (Fig. 3) to measure the time to receive a reflected pulse at each element of the array.

Regarding **claims 3, 10, 17 and 27** which are dependent in claims 1, 8, 15 and 24 respectively, **The robot of claim 1, wherein the distance indication is produced by measuring an energy of a reflected pulse up to a cutoff time.** - Bamji describes two ways to measure distance, the first second embodiment, extending across columns 12 – 15, especially col. 13 lines 8-16 utilizes a detector, shutter and charge accumulator or integrator circuit (Fig. 9) to measure the charge in a reflected pulse up to a shutter closure at each element of the array.

Regarding **claims 5, 12, 19 and 29** which are dependent in claims 2, 9, 16 and 25 respectively, **The robot of claim 2, wherein the feature is a step.** – Fig, 2 of Bamji shows a shape that can be detected including an inclined plane of a pyramid. The edge of the pyramid shows a step between the pyramid and the background.

Regarding **claim 6, 13, 20 and 30** which are dependent in claims 2, 9, 16 and 25 respectively, **The robot of claim 2, wherein the feature is an object in a room.** – At Bamji col. 7 lines 1-4, the detector can recognize shapes.

Regarding **claims 35 and 38,** which depend respectively form claims 1 and 15, **The robot of claim 1, further comprising a memory device for storing the one or more frames of distance indications.** – Bamji Fig. 2 shows memory 270 and col. 6 lines 62-67 discusses using the RAM 270 to store frames of data. including storing consecutive frames.

Regarding **claims 7, 14, 21, and 31** which are dependent on claims 1, 8, 15, and 24 respectively, **The robot of claim 1, wherein the robot is a robot cleaner.** – In Nishikado, the autonomous device is identified performing cleaning of the floor (Col. 2, 65-67).

Claims **4, 11, 18, 28, 34 and 37** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bamji/Nishikado as applied to claim 2 above, and further in view of U.S. Patent No. U.S. Patent No. 6,338,013 to Ruffner. Ruffner is concerned with a multifunctional mobile appliance that uses obstacle avoidance.

Regarding **claims** 4, **11, 18, 28, 34 and 37** which are dependent on claims 2, 9, 16 and 25 respectively, **The robot of claim 2, wherein the feature is indicated in an internal map of the environment. -** Bamji does include some memory but not enough

to comprise a map of the environment of the robot. Nishikado includes memory but is not specific as to what structures are held in it. However, Ruffner specifically recites at col. 12, lines 8-12 including any found objects in the map of the environment that it maintains. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the memory in Nishikado for the purpose discussed in Ruffner as both devices seek to avoid obstacles and it is applying prior art elements according to known methods to accomplish a predictable result.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LIN B. OLSEN whose telephone number is (571)272-9754. The examiner can normally be reached on Mon - Fri, 8:30 -5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on 571-272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lin B Olsen/
Examiner, Art Unit 3661

/Thomas G. Black/
Supervisory Patent Examiner, Art Unit 3661